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SPATIAL DEPRIVATION AND THE INVISIBLE CAREGIVER: AN EMPIRICAL ASSESSMENT OF DEFICIENCIES IN NIGERIAN TERTIARY HOSPITAL WARDS

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ABSTRACT

Informal caregivers, predominantly family members, are the bedrock of patient care in Nigerian tertiary hospitals, compensating for chronic staff shortages and resource deficits. Despite their indispensable role, Nigerian hospital environments are rarely designed to accommodate their presence, leading to significant physical and emotional burdens. This study empirically assesses the spatial deficiencies informal caregivers face in three tertiary hospital wards in Jos, Nigeria. Using a convergent mixed-methods case study design. Data were collected from 196 informal caregivers through structured questionnaires, supported by field observations, semi-structured interviews with 12 healthcare professionals, and focus group discussions. Quantitative data were analysed using descriptive statistics, correlation, and multiple regression, while qualitative data were analysed thematically. The findings reveal pervasive spatial inadequacies: 95.9% of caregivers reported a lack of rest and sleeping facilities, 93.9% reported overcrowding, and 91.8% reported inadequate storage. Overall satisfaction with the caregiving environment was extremely low (mean = 1.7, SD = 0.8). Regression analysis identified sleeping space ($\beta = 0.45$, $p < 0.001$), privacy ($\beta = 0.32$, $p < 0.01$), and sanitation ($\beta = 0.28$, $p < 0.05$) as the most significant predictors of caregiver satisfaction. Overcrowding was strongly and positively correlated with emotional stress ($r = 0.71$, $p < 0.001$). The study concludes that systematically neglecting caregivers in hospital design is a critical failure that compromises both caregiver well-being and the quality of patient care. It recommends immediately integrating caregiver-inclusive principles, prioritising restorative rest areas, privacy, and sanitation, into hospital design and policy.

Keywords: Informal Caregivers, Hospital Design, Spatial Deficiencies, Caregiver-Inclusive Design, Environmental Psychology.

1. INTRODUCTION

Despite their critical contributions, Nigerian hospitals are designed primarily for clinical staff and patients and systematically neglect caregivers, who are essential to the system (Adejoh et al., 2021). This oversight leaves caregivers in overcrowded, unsanitary, and uncomfortable conditions, often sleeping on floors, waiting in corridors, and performing demanding tasks without basic amenities such as seating, storage, or privacy (Barrah, 2025). Such spatial deprivation causes significant physical and emotional strain, undermines caregivers' ability to provide effective, safe care, and ultimately compromises patient outcomes (Adebayo et al., 2024; Cui et al., 2024).

Although sociological and public health research documents the burdens of informal caregiving, a critical gap remains in systematic assessments of hospital wards' physical and architectural deficiencies from caregivers' perspectives (Ebigbo et al., 2022; Silaule et al., 2024). This study addresses that gap through an empirical, mixed-methods assessment of the spatial deficiencies informal caregivers face in three major referral hospitals in Jos, Nigeria. It quantifies the problem and explores caregivers' lived experiences to inform a caregiver-inclusive design framework. The study aims to assess the nature and prevalence of spatial deficiencies affecting informal caregivers in selected tertiary hospital wards in Jos; examine how these conditions relate to caregiver outcomes, including stress and overall satisfaction; and propose evidence-based architectural priorities to address these deficiencies and support caregivers.

2. LITERATURE REVIEW

2.1 The Indispensable but Invisible Caregiver in Nigeria

In this context, informal caregivers perform a wide array of tasks, including ADLs such as bathing and feeding, as well as clinically significant functions such as medication reminders and patient monitoring (Adebayo et al., 2024; Mwale et al., 2024). Studies indicate that caregivers typically spend 12 to 18 hours daily in hospital settings and remain there for days, weeks, or even months, depending on the patient's condition (Adebayo et al., 2025). This prolonged presence imposes significant physical, emotional, and financial burdens. Physically, caregivers endure musculoskeletal strain from demanding tasks without ergonomic support, sleep deprivation from inadequate sleeping arrangements, and fatigue from prolonged standing and continuous vigilance. Emotionally, caregivers experience anxiety, stress, depression, and burnout from witnessing loved ones' suffering (Cui et al., 2024; Barrah, 2025).

2.2 The Impact of the Hospital Environment on Caregiver Well-being

Research in environmental psychology and healthcare design consistently shows that the physical environment profoundly affects human health and well-being. For caregivers who spend prolonged periods in wards, the environment can be a source of chronic stress or a facilitator of coping and resilience (Ulrich, 1991). The literature identifies several key design features that influence caregiver comfort: ergonomic seating, rest areas, access to natural light and ventilation, and privacy (Sadigh et al., 2016; Nimlyat et al., 2021).

2.3 Spatial Needs to Support Informal Caregivers

Caregivers bring personal belongings, food, medications, and other essentials into the hospital environment, yet most Nigerian hospital wards lack storage facilities such as lockers or cabinets (Barrah, 2025). Without secure storage, caregivers often store belongings under beds, in plastic bags, or in circulation spaces, creating clutter, compromising hygiene, and increasing the risk of theft or loss. The lack of storage also prevents caregivers from having a sense of territoriality and control over their environment, contributing to anxiety and stress.

Sanitation is a critical spatial need that directly affects caregiver health and well-being. In Nigerian hospitals, caregivers share toilets and bathing facilities with patients and staff, leading to congestion, inadequate hygiene, and increased infection risk (Nwagwu & Akanji, 2024). Without caregiver-specific sanitation facilities, caregivers must queue for limited facilities, often during peak periods, and may struggle to maintain personal hygiene during prolonged hospital stays. This lack of access to adequate sanitation compromises caregiver health, dignity, and comfort.

2.4 The Nigerian Healthcare System and the Policy Vacuum

Nigeria's healthcare policy framework has historically overlooked informal caregivers' needs. While mandating basic healthcare provision, the National Health Act (2014) includes no provisions for caregiver support spaces, and as of 2023, only 30% of its objectives were implemented (Nigeria Health Watch, 2023). Similarly, the National Health Policy (2016) emphasises family participation in care but provides no implementation guidelines for physical infrastructure. The Primary Healthcare Under One Roof (PHCUOR) initiative, launched in 2011 to integrate services, also neglects caregiver accommodation needs (Federal Ministry of Health, 2016). These policy gaps have tangible consequences: 0% of health budgets are earmarked for caregiver support (Ikeorji & Ubani, 2024). Tertiary hospitals allocate less than 1% of spending to family amenities, leaving informal caregivers without essential resources (Onyeka et al., 2024).

The review identifies critical gaps in the Nigerian context: a lack of comprehensive empirical assessment of spatial deficiencies; evidence-based, caregiver-inclusive design frameworks; and integrated approaches that systematically address spatial and technological needs; neglect of cultural considerations in hospital design; and a policy vacuum around caregiver provisions. These gaps justify this study's aim to assess spatial provisions for informal caregivers and develop an evidence-based, caregiver-inclusive design framework tailored to the Nigerian context.

3. MATERIALS AND METHODS

This study used a convergent mixed-methods case study design to provide a holistic, in-depth understanding of the phenomenon. This approach allows simultaneous collection of quantitative and qualitative data, enabling methodological triangulation and more robust analysis. The research was rooted in a pragmatist research philosophy, recognising that no single worldview can fully address complex social and spatial issues. Pragmatism allows for the combination of positivist assumptions, which focus on observable realities such as caregiver spaces, with interpretivist assumptions, which emphasise informal caregivers' meanings, perceptions, and experiences.

The study was conducted in the medical wards of three major tertiary referral hospitals in Jos, Plateau State, Nigeria, is located in North-Central Nigeria and serves as a hub for education, healthcare, and trade. With an estimated population exceeding 900,000, the city attracts patients from Plateau and neighbouring states, including Bauchi, Nasarawa, Taraba, and Kaduna. Hospitals were purposively selected to represent varied ownership and management: Jos University Teaching Hospital (JUTH), a federally owned teaching hospital established in 1975 with approximately 620 beds; Bingham University Teaching Hospital (BHUTH), a faith-based teaching hospital established in 1959 with 400 beds; and Plateau State Specialist Hospital (PSSH), a state-owned specialist hospital with 176 beds. These hospitals are regional referral centres and host many informal caregivers.

Figure 1 illustrates the geographical distribution of the three selected tertiary hospitals within Jos, Plateau State. The hospitals represent different institutional ownership structures: a federal teaching hospital, a faith-based teaching hospital, and a state-owned specialist hospital. Their selection provides an opportunity to examine spatial deficiencies experienced by informal caregivers across different hospital environments within the same geographical context.

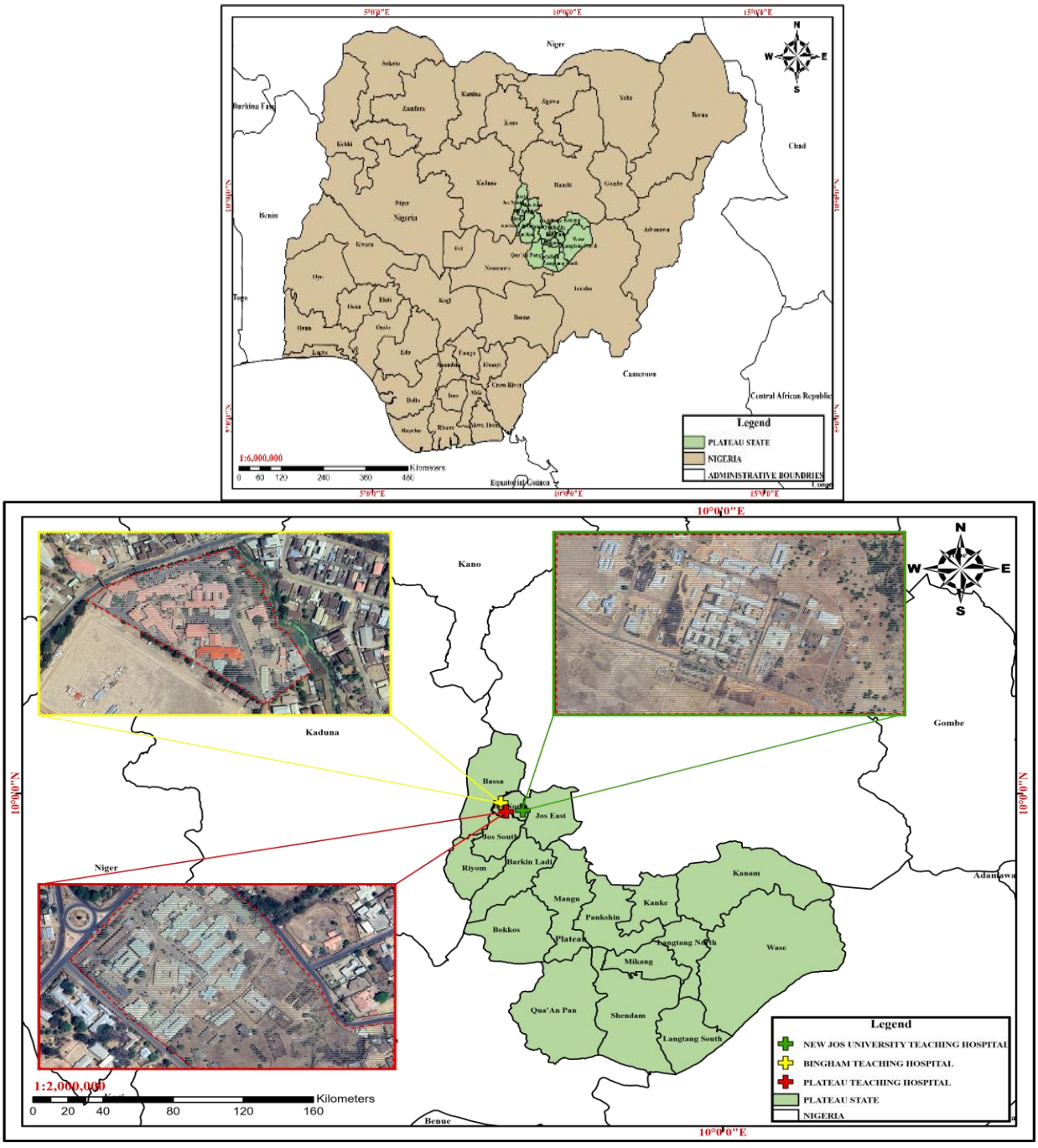


Figure 1: Location of the three selected tertiary hospitals in Jos, Plateau State, Nigeria
Source: National Centre for Remote Sensing (2025)

For the quantitative survey, the sample size of 196 informal caregivers was calculated using Yamane's (1967) finite population formula, with a 95% confidence level and a 5% margin of error. The formula is: $n = N / (1 + N(e^2))$, where n is the required sample size, N is the total population size, and e is the margin of error (5% = 0.05). The caregiver populations were estimated at 120 for JUTH, 70 for BHUTH, and 50 for PSSH. Using the formula, the required sample sizes were approximately 92 for JUTH, 60 for BHUTH, and 44 for PSSH, totalling 196 informal caregivers. This sample was proportionally allocated across the three hospitals based on their estimated caregiver populations. Participants were selected purposively based on the inclusion criteria of being a primary caregiver for at least one week, being a family member or close relative of a hospitalised patient, providing unpaid caregiving support, and being present in the ward during data collection.

For the qualitative component, a purposive sample of 12 healthcare professionals (4 from each hospital) was selected for semi-structured interviews. This sample included management staff, consultants, and nurses to capture diverse professional perspectives. Selection criteria included direct involvement in inpatient ward operations, at least one year of hospital experience, and willingness to participate. We conducted three Focus Group Discussions (FGDs), one at each hospital, with 8-10 informal caregivers per group to explore shared experiences and collective perceptions.

Data were collected using four primary instruments. First, a structured questionnaire was administered to the 196 caregivers. It collected data on demographics, caregiving tasks, spatial challenges, environmental conditions, caregiver well-being, and satisfaction. The questionnaire was organised into five thematic sections: demographic and socio-economic characteristics; caregiving roles and responsibilities; spatial provisions and environmental conditions; caregiver well-being and perceived patient outcomes; and open-ended questions for additional comments and recommendations. Fourth, a structured observation checklist was used by the researchers to systematically document the physical conditions of the wards, including ward layout and typology; bed density and spacing; the availability and condition of seating and rest areas; designated sleeping facilities; storage facilities; sanitary facilities; privacy infrastructure; circulation pathways; ventilation, lighting, noise levels; technological infrastructure; and the observable behaviours and activities of informal caregivers. Observations were conducted at different times of day, including morning clinical rounds, visiting periods, evening shifts, and overnight sessions, to capture temporal variations.

Quantitative questionnaire data were entered, cleaned, and analysed using SPSS. Descriptive statistics (frequencies, percentages, means, standard deviations) were used to summarise the data. Chi-square analysis was used where applicable to examine associations between categorical variables, including caregiver characteristics and reported behaviours. Pearson's correlation analysis examined the strength and direction of relationships between caregiving duration, overcrowding, stress, and satisfaction. Multiple regression examined the relative contribution of spatial variables to caregiver satisfaction. No claim of clinical causation was made from these analyses.

Qualitative data from the interviews and FGDs were audio-recorded and transcribed verbatim, then analysed thematically using Braun and Clarke's six-phase approach: familiarisation with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. NVivo software facilitated systematic coding and theme development. The themes were then triangulated with the quantitative findings to provide a comprehensive picture.

The relevant institutional ethics review authorities approved the study before data collection began. Formal permission was also sought from the management of the selected hospitals. Participation in the study was entirely voluntary. Informed consent was obtained from all participants before questionnaires, interviews, focus groups, or observational activities involving participant interaction. Ward observations focused on the environment, space, and caregiving practices rather than intrusive examination of patients' private medical information. No clinical records or confidential patient files were accessed. The study-maintained confidentiality and anonymity by protecting participants' identities with codes, pseudonyms, or categories rather than personal names.

4. RESULTS AND DISCUSSION

4.1 Demographic and Caregiving Profile of Respondents

A total of 196 informal caregivers participated in the survey across the three hospitals, with the sample distributed proportionally according to the estimated caregiver population at each institution: 92 from JUTH, 60 from BHUTH, and 44 from PSSH. The age distribution shows that caregiving spans all adult age groups, with a notable concentration in middle adulthood. The largest proportion of informal caregivers were aged 36-45 (39.8%, n = 78), followed by those aged 26-35 (27.6%, n = 54). The 46-55 age group accounted for 19. 4% (n = 38), those aged 18-25 for 7.1% (n = 14), and the oldest age group (56 years and above) for 6. 6.1% (n = 12).

Detailed data on caregiving duration and daily time commitment indicate prolonged, intensive engagement in hospital settings. Nearly half of respondents (49. 0%, n = 96) reported hospital stays lasting one to two weeks, with many experiencing multiple such stays. An additional 9. 9.8% (n = 19) reported stays of two to three weeks, and 11. 0% (n = 21) stayed three to four weeks. A small portion of respondents (2. 2.0%, n = 4) reported stays exceeding one month, ranging from one to three months, with some even longer. Daily caregiving commitments were substantial. Over half of respondents (53. 1%, n = 104) reported spending more than 12 hours per day in the hospital, and an additional 28. 6% (n = 56) spent between 8 and 12 hours per day. A small minority, 3. 3.6% (n = 7), indicated shorter caregiving durations of less than 4 hours.

The survey findings underscore the multidimensional nature of informal caregiving responsibilities. Respondents reported physical assistance as the most prevalent caregiving function, at 93. 9% (n = 184). This category included support with bathing, mobility, hygiene, and other activities of daily living. Emotional support was similarly widespread, with 88. 8% (n = 174) of informal caregivers reported involvement in reassurance, companionship, and psychological support. Feeding assistance was reported by 86. 2% (n = 169) of respondents. Other responsibilities included medication reminders (66. 8%, n = 131), communicating with healthcare professionals (58. 2%, n = 114), monitoring wounds or lines (34. 2%, n = 67), and providing informal counselling or peer support to other informal caregivers (28. 1%, n = 55).

4.2 Prevalence of Major Spatial Deficiencies

The survey revealed widespread spatial inadequacies. The most critical issue was the lack of rest and sleeping facilities: 95.9% (n=188) of informal caregivers reported these were inadequate. Observations likewise documented caregivers sleeping on floors, cardboard, benches, and other improvised surfaces. Overcrowding was the second most common challenge, affecting 93.9% (n=184) of caregivers and causing discomfort and resource strain. Observations found that wards designed for 24 patients often held 38–45, with bed spacing below recommended clinical standards.

Figure 2 summarises the prevalence of the principal spatial deficiencies identified by informal caregivers in the selected tertiary hospital wards. Inadequate sleeping and resting facilities

constituted the most frequently reported deficiency (95.9%), followed by overcrowding (93.9%), inadequate privacy (88.8%) and poor sanitation (84.7%). The consistently high proportions demonstrate that spatial deprivation is widespread across several components of the caregiving environment. The results identify resting facilities, circulation management, privacy and sanitation as important priorities for architectural improvement.

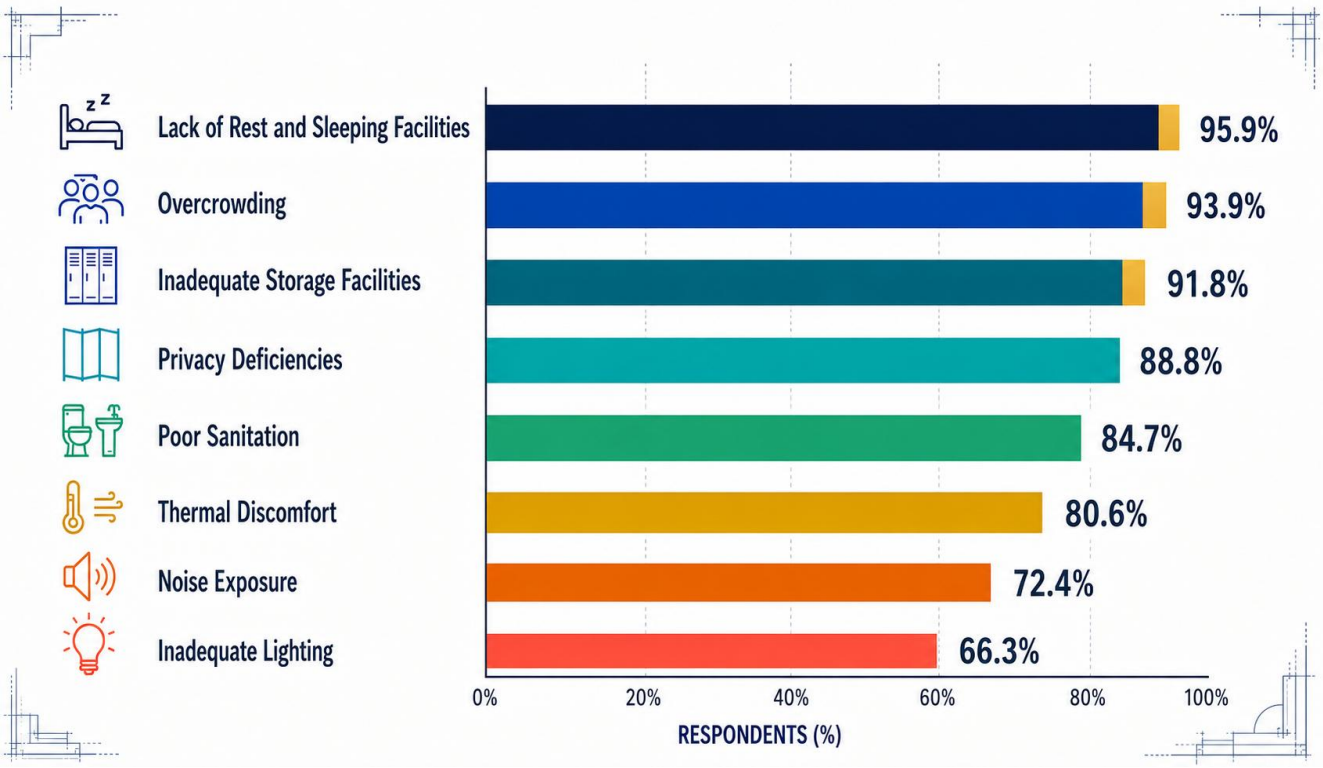


Figure 2: Prevalence of major spatial deficiencies reported by informal caregivers in selected tertiary hospital wards in Jos (N = 196).

Figure 3 shows the spatial consequences of inadequate caregiver accommodation. Informal caregivers occupy corridors and circulation spaces intended for patients, staff, and medical equipment, reflecting the lack of designated resting and waiting areas. This contributes to congestion and competing demands on ward space, supporting the survey finding that 93.9% of respondents identified overcrowding as a major spatial deficiency.



Figure 3: Informal caregivers occupying circulation spaces due to inadequate designated caregiver accommodation in the selected hospitals.

A total of 88.8% (n = 174) of respondents reported privacy deficiencies, indicating that many informal caregivers lacked personal space and confidentiality. This finding is consistent with previous research on hospital environments, which has highlighted how open-ward designs can limit privacy through continual visual and auditory exposure. In Nigerian hospitals, these settings may leave caregivers without private space for emotional expression, confidential conversations, or personal reflection. Similarly, 84.7% (n = 166) of respondents reported poor sanitation, raising concerns about health and hygiene standards. Previous research has also identified shared and inadequate sanitation facilities as challenges in hospital settings. In Nigerian hospitals, care givers may share toilets and bathing facilities with patients and staff, contributing to congestion, poor hygiene, and increased infection risk. When caregiver-specific facilities are unavailable, caregivers may need to queue, particularly during peak periods, and may struggle to maintain personal hygiene during prolonged hospital stays.

Satisfaction ratings for ward design components were overwhelmingly negative, with an overall mean of 1.7 (SD = 0.8) on a five-point scale. Dissatisfaction was highest for storage facilities (93.9%, n = 184) and sleeping space (91.8%, n = 180); privacy, seating, ventilation, and sanitation

also had dissatisfaction levels exceeding 84%. This pattern suggests that caregiver dissatisfaction is systemic rather than attributable to a single design shortcoming. These findings align with previous research reporting that inadequate ward space and deficiencies in the physical care environment can negatively affect caregiving experiences and care quality. The perceived importance of the environment was also clear: 91.8% of respondents believed that improved spatial provision would enhance caregiving effectiveness, while 89.8% thought design changes would improve patient outcomes.

In response to inadequate environmental provisions, informal caregivers reported widespread reliance on adaptive coping strategies. Sleeping on floors, benches, or improvised materials was the most prevalent strategy, used by 89.3% (n=175) of respondents. Storage improvisation was equally common, with 75.5% (n=148) using plastic bags and under-bed spaces to safeguard belongings. Religious coping practices were prominent, with 66.8% (n=131) of respondents reporting their use. Other coping strategies included eating outside the wards or skipping meals (61.2%), using mobile phone flashlights at night (53.6%), rotating caregiving responsibilities among family members (50.0%), and using toilets during off-peak periods to avoid congestion (44.4%).

4.3 The Lived Experience: Thematic Findings

Theme 1: The Indignity of Improvised Rest. Field observations confirmed that, without designated sleeping areas, caregivers were forced to sleep on flattened cardboard boxes, benches, or directly on the bare floor next to patient beds. A night-time visit to JUTH documented a female caregiver, approximately 45 years old, sleeping on a flattened cardboard box without bedding or protection. Personal belongings were stored in a plastic bag beneath the bed. A nurse at JUTH described the scene: "Informal caregivers sleep on the floor beside patients' beds. They use cardboard, mats, even wrappers laid on the concrete. They stay in these conditions for weeks, sometimes months. It is dehumanising. They are exhausted, yet they have nowhere else to go." A caregiver in an FGD articulated the physical toll of this reality: "I have not slept on a bed for three weeks. My back pains me. However, my mother needs me. I sleep on the floor, but I cannot sleep properly. The floor is hard, the ward is noisy, and I worry about my mother. I am exhausted all the time.

Figure 4 provides photographic evidence of the adaptive resting arrangements informal caregivers adopted in response to inadequate institutional provision. Caregivers were observed resting beneath trees and sleeping outside hospital wards, indicating that designated spaces for restorative rest were insufficient or unavailable. These observations align with questionnaire findings: 95.9% of respondents reported inadequate sleeping facilities. The photographs further demonstrate that caregiver spatial deprivation extends beyond the ward interior into surrounding outdoor areas, where available spaces are informally appropriated for rest.



(a) Informal caregivers resting beneath a tree

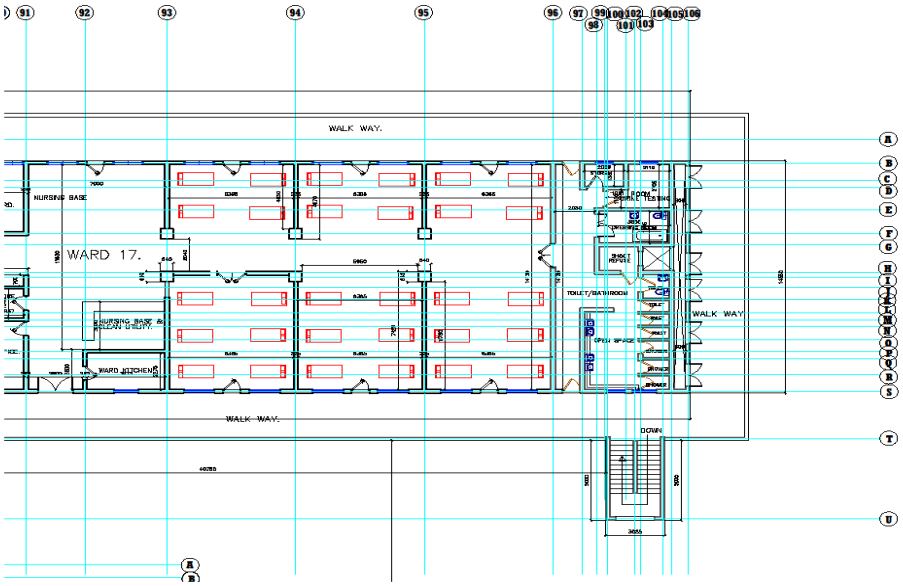


(b)Informal caregivers sleeping outside the hospital ward.

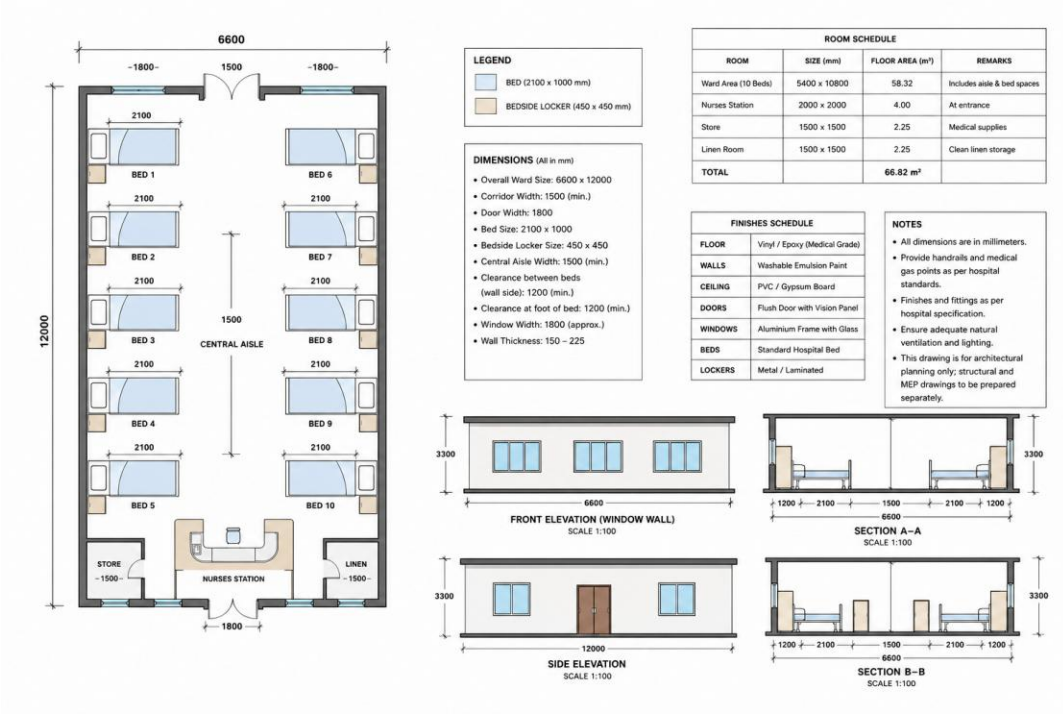
Figure 4: Informal caregivers adopting improvised resting arrangements at Plateau State Specialist Hospital: (a) resting beneath a tree; (b) sleeping outside the hospital ward.

Theme 2: A Contested Space - Overcrowding and Circulation Conflict. Wards designed for 24 patients often held 38 to 45, leaving less than 0.6 metres of circulation space beside beds in 80% of observed cases. This created a contested environment where caregiving activities, staff movement, and personal belongings clashed. A healthcare professional recounted the operational impact: "Informal caregivers sleep in the corridors. At night, we have to step over them. It slows down emergency response. When there is a medical emergency, every second counts, but we cannot move quickly because the corridors are blocked." An observational sketch from PSSH recorded two caregivers sleeping across a key corridor, forcing staff to navigate around or over them because no alternative routes existed.

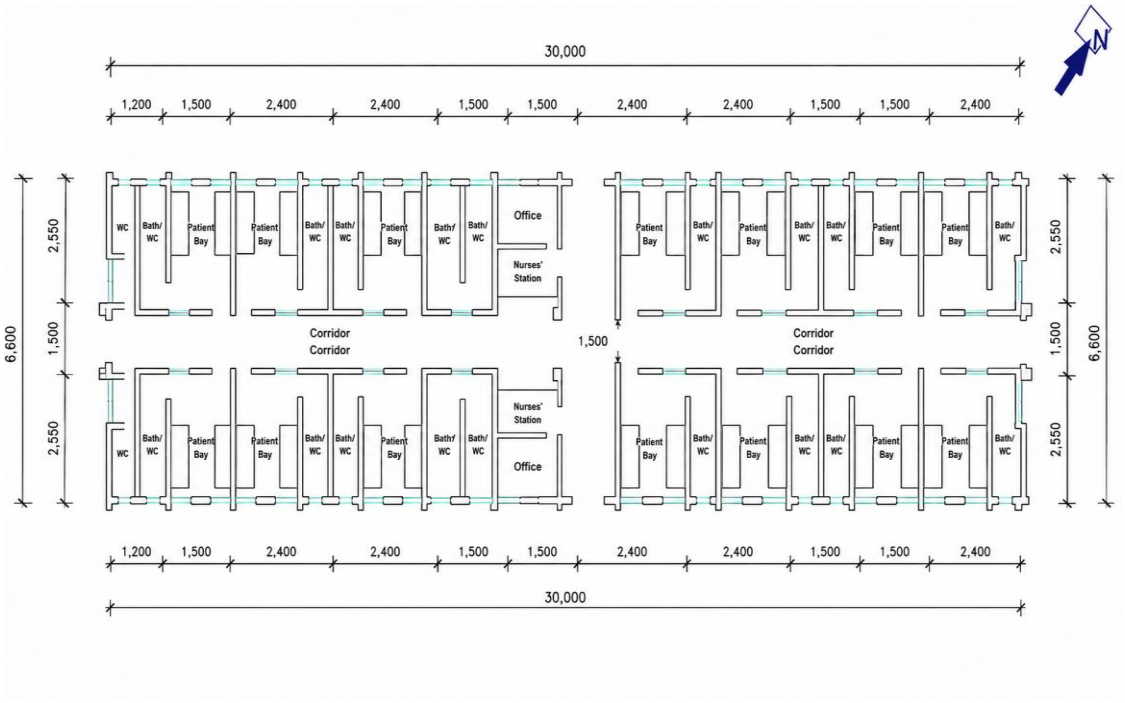
Figure 5 shows ward configurations in the three case-study hospitals. Despite differences in layout and spatial organisation, the wards offer little dedicated space for informal caregivers. At Jos University Teaching Hospital, the open layout creates competition for bedside and circulation space. At Bingham University Teaching Hospital, the cellular arrangement restricts caregiver space in patient rooms. At Plateau State Specialist Hospital, the linear corridor encourages caregivers to occupy circulation areas. These differences show that caregiver spatial deprivation occurs across ward typologies, not just one architectural layout.



(a) JUTH — Second Floor Ward Plan / Female Medical War



(b) BHUTH — Medical Ward



(c) PSSH — Typical Ward Design

Figure 5: Comparative architectural configurations of the selected hospital wards: (a) Jos University Teaching Hospital; (b) Bingham University Teaching Hospital; and (c) Plateau State Specialist Hospital.

Theme 3: The Policy Vacuum and Institutional Invisibility. Interviews with healthcare professionals revealed a critical absence of formal institutional policy governing caregiver accommodation. An administrator at PSSH explained: "We have no policy on informal caregivers. No guidelines on where they should stay, what facilities they should have, or how many can be present. This creates inconsistency. Different wards handle things differently. It depends on the nurse-in-charge, not on any institutional standard." A senior consultant at BHUTH observed: "If there is no policy, there is no budget. If there is no budget, there is no facility. This is why we have no caregiver lounges, no sleeping areas, no dedicated waiting spaces. These things are not considered essential because they are not included in any policy document."

Table 1 presents the convergence between quantitative survey responses, direct field observations and the experiences reported during interviews and focus group discussions. The findings show consistency across evidence sources, particularly regarding inadequate resting facilities, overcrowding, storage limitations, privacy deficiencies, and poor sanitation. Respondents reported these conditions, and observations and qualitative discussions also documented them. The convergence strengthens the credibility of the findings and provides an empirical basis for identifying priority architectural interventions in the selected hospital wards.

Table 1: Triangulation of survey findings, field observations and qualitative evidence on caregiver spatial deficiencies.

Spatial deficiency	Survey evidence	Observational/qualitative evidence	Architectural implication
Inadequate rest	95.9%	Floor sleeping, fatigue, physical discomfort	Dedicated rest provision
Overcrowding	93.9%	Congested bedside spaces and corridors	Improved circulation and caregiver zoning
Inadequate storage	91.8%	Bags and possessions stored beneath beds	Secure lockers
Privacy	88.8%	Open visual and auditory exposure	Privacy screens and consultation spaces
Sanitation	84.7%	Shared and congested sanitary facilities	Dedicated caregiver sanitation

The 91.8% storage figure is the reported inadequacy measure, distinct from the article's 93.9% storage-dissatisfaction measure

4.4 Inferential Analysis: Predictors of Caregiver Satisfaction

The inferential analysis provides deeper insight into relationships between caregiver characteristics, environmental conditions, and satisfaction outcomes. Several statistically significant relationships were identified. Correlation analysis revealed a significant negative correlation between satisfaction with ward design and daily caregiving duration ($r = -0.62$, $p < 0.001$), indicating that greater exposure to existing ward environments is associated with declining satisfaction. This finding suggests that informal caregivers who spend more time in the hospital become increasingly dissatisfied with the conditions, highlighting the cumulative negative effect of prolonged exposure to inadequate environments. Conversely, overcrowding was strongly and positively associated with emotional stress ($r = 0.71$, $p < 0.001$), suggesting that spatial density substantially contributes to psychological burden among informal caregivers.

Regression analysis of predictors of caregiver satisfaction yielded a significant model (Adjusted $R^2 = 0.58$, $F(4,192) = 68.4$, $p < 0.001$). The model explains 58% of the variance, indicating strong predictive power. Sleeping space availability was the strongest positive predictor ($\beta = 0.45$, $p < 0.001$), followed by privacy ($\beta = 0.32$, $p < 0.01$) and sanitation quality ($\beta = 0.28$, $p < 0.05$). Longer caregiving hours were negatively associated with satisfaction ($\beta = -0.23$, $p < 0.05$), confirming that extended hospital stays reduce satisfaction. These findings identify key environmental factors linked to the caregiver experience. The significance of sleeping space, supported by observations and qualitative data, highlights its importance. The model's predictive power suggests that architectural improvements in sleeping, privacy, and sanitation could significantly enhance caregiver satisfaction.

Table 2 presents the reported standardised regression coefficients for the factors associated with caregiver satisfaction. Sleeping-space availability exhibited the strongest positive association with satisfaction ($\beta = 0.45$, $p < 0.001$), followed by privacy ($\beta = 0.32$, $p < 0.01$) and sanitation quality ($\beta = 0.28$, $p < 0.05$). Daily caregiving hours were negatively associated with satisfaction

($\beta = -0.23$, $p < 0.05$), suggesting that longer caregiving periods were linked to lower satisfaction ratings. These results support prioritising restorative rest, privacy, and sanitation when developing caregiver-supportive architectural interventions.

Table 2: Reported standardised regression coefficients for predictors of informal caregiver satisfaction.

Independent variable	Standardised β	Reported significance
Sleeping-space availability	0.45	$p < 0.001$
Privacy	0.32	$p < 0.01$
Sanitation quality	0.28	$p < 0.05$
Daily caregiving hours	−0.23	$p < 0.05$

The finding that inadequate sleeping provision is the most critical deficiency and the strongest predictor of caregiver dissatisfaction is a central contribution. It confirms anecdotal reports and studies documenting floor sleeping in Nigerian hospitals (Ebigbo et al., 2022; Silaule et al., 2024). The survey finding that 95.9% of respondents reported inadequate sleeping facilities is one of the most striking indicators of institutional neglect. From the perspective of Stress Reduction Theory (Ulrich, 1991), the absence of a restorative sleeping environment functions as a chronic, powerful stressor. The resulting sleep deprivation impairs cognitive function, emotional regulation, and physical stamina, creating a vicious cycle of fatigue and burnout that directly compromises caregiving effectiveness. The strong negative correlation between satisfaction with ward design and daily caregiving duration ($r = -0.62$, $p < 0.001$) empirically supports this theoretical perspective, showing that prolonged exposure to inadequate sleeping conditions reduces satisfaction and well-being.

The strong correlation between overcrowding and emotional stress ($r = 0.71$, $p < 0.001$) supports the argument that spatial density is not just an inconvenience but a significant psychological burden. This finding supports the work of Solikhah (2023) and highlights how overcrowding creates a state of sensory overload, eroding privacy and personal space, and amplifying anxiety. This directly undermines the ability to receive Social Support (Cullen, 1994), as the chaotic environment hinders confidential communication and emotional respite. The observation that circulation space beside patient beds measured less than 0.6 metres in approximately 80% of ward environments illustrates the extreme spatial constraints caregivers operate under. This finding is architecturally significant because it demonstrates that existing ward designs are not merely uncomfortable but functionally inadequate for the activities they must accommodate.

The comparative analysis of the three hospitals reveals that despite differences in spatial typology, all share common deficiencies in caregiver provisions. JUTH's open-ward design provides no designated caregiver spaces, forcing caregivers to occupy circulation areas and patient bays. BHUTH's cellular design provides no designated caregiver spaces, forcing caregivers to share cramped patient rooms. PSSH's linear corridor design provides no designated caregiver spaces, forcing caregivers to occupy corridors and circulation spaces. This finding is consistent across hospital types and ownership structures, suggesting that the neglect of caregiver provisions is systemic rather than idiosyncratic.

This study's findings have significant implications for hospital design and policy. The regression analysis provides clear empirical guidance for prioritising architectural interventions. Sleeping provision should be the highest priority, as it emerged as the strongest predictor of caregiver satisfaction ($\beta = 0.45$, $p < 0.001$). Simple, cost-effective interventions such as providing fold-out beds, dedicated rest lounges, or sleeping rooms could significantly improve caregiver experiences. The strong predictive power of privacy ($\beta = 0.32$, $p < 0.01$) and sanitation ($\beta = 0.28$, $p < 0.05$) suggests that interventions addressing these areas would yield substantial benefits. The strong correlation between overcrowding and emotional stress ($r = 0.71$) suggests that decongesting ward environments should be a priority intervention for improving caregiver well-being and, by extension, patient care outcomes.

The finding that 91.8% of caregivers believed improved spatial provision would enhance their effectiveness, and that 89.8% believed design changes would improve patient outcomes, demonstrates a strong perceived need for caregiver-inclusive hospital environments. Because patient clinical records were not examined, this latter finding is interpreted as a perceived or anticipated patient-care benefit rather than a demonstrated recovery effect.

5. CONCLUSION

This study clearly shows that informal caregivers in Nigerian tertiary hospitals face severe, pervasive spatial deprivation. The hospital ward, a caregiver's de facto home for days or weeks, lacks the most basic provisions for rest, privacy, and sanitation. This neglect is not a minor oversight but a fundamental design failure that measurably harms caregiver well-being and, by extension, jeopardises the quality and safety of patient care. The overwhelming prevalence of deficiencies (95.9% for sleeping provision, 93.9% for overcrowding, 91.8% for storage, 88.8% for privacy, and 84.7% for sanitation) coupled with an overall satisfaction mean of 1.7 on a five-point scale, paints a picture of a system in crisis.

6. RECOMMENDATIONS

Architectural Practice: Architects and healthcare planners must move beyond a patient-and-staff-centric model. Ward designs should incorporate a hierarchy of caregiver support spaces, from bedside provisions (ergonomic seating, privacy curtains) to ward-level facilities (rest lounges, secure lockers, designated sanitation facilities) and hospital-level amenities (family consultation rooms, quiet rooms). The design process should actively include feedback from informal caregivers on their roles and experiences to ensure their voices are heard and valued.

Policy and Accreditation: The Nigerian government, through bodies like the Federal Ministry of Health and the Medical and Dental Council of Nigeria (MDCN), must revise the National Health Act (2014) and hospital accreditation standards. These should mandate minimum spatial provisions for informal caregivers, such as a specified number of sleeping spaces, rest areas, and sanitation facilities per ward. Gender-sensitive designs, including private spaces for nursing mothers and childcare facilities, should be included to acknowledge the disproportionate care burden women shoulder.

Hospital Management: Hospital administrators should recognise caregivers as legitimate stakeholders. This includes developing clear institutional accommodation policies, maintaining designated facilities, and involving them in care coordination through designated communication points. Simple, cost-effective interventions such as fold-out beds, privacy screens, and lockable storage could be implemented immediately to improve caregivers' conditions.

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